MEMO

DATE: December 14, 2007

TO: Energy & Environment Committee
Transportation & Communication Committee

FROM: Jonathan Nadler, Program Manager, (213)236-1884, nadler@scag.ca.gov

SUBJECT: California Global Warming Solutions Act of 2006

BACKGROUND:

Historically, atmospheric gases such as water vapor, carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), ozone (O_3), halocarbons (HFC's) and others have trapped terrestrial radiation in the Earth's atmosphere, which has maintained a temperature and climate hospitable to life over much of the Earth. This is a condition known as the "greenhouse effect." Different greenhouse gases have different effects on the Earth's energy balance.

Greenhouse gas emissions resulting from human activities are substantially increasing the atmospheric levels of the greenhouse gases. Carbon dioxide emissions have increased 30% during the past century largely due to fossil fuel combustion which produces the largest amount of CO_2 emissions (about 80% of United States GHG emissions and about 87% of California emissions). In California, approximately 43% of the CO_2 emissions come from cars and trucks. Methane emissions have doubled in the past 100 years. Over the same period, nitrous oxide levels have risen about 15%. Agriculture is a major source of both methane and nitrous oxide, with additional methane coming primarily from landfills. Halocarbons are another greenhouse gas. Most halocarbon emissions come from their use as refrigerants, solvents, propellant agent, and industrial processes. Manufactured compounds, like HFCs, persist in the atmosphere for long periods of time and have far greater effects at lower concentrations as compared to CO_2. Although the amount released of these compounds is small, they are very effective at trapping heat in the atmosphere.

Because of California's massive and growing economy, the state is the 12th largest emitter of carbon in the world despite leading the nation in energy efficiency standards and lead role in protecting its environment. In response, Governor Schwarzenegger has taken a lead in addressing global warming, and recently signed AB 32 by Assembly Speaker Fabian Nunez (D-Los Angeles), California's landmark bill that establishes a first-in-the-world comprehensive program of regulatory and market mechanisms to achieve real, quantifiable, cost-effective reductions of greenhouse gases.

AB 32 requires the California Air Resources Board (CARB) to develop regulations and possibly market mechanisms that will ultimately reduce California's greenhouse gas emissions by 25 percent by 2020. Mandatory caps will begin in 2012 for significant sources and ratchet down to meet the 2020 goals. In the interim, CARB will begin to measure the greenhouse gas emissions of the industries it determines as significant sources of greenhouse gas emissions. The bill also provides the Governor the ability to invoke a safety valve and suspend the emissions caps for up to one year in the case of an emergency or significant economic harm.

MEMO

Specifically, AB 32, the California Global Warming Solutions Act of 2006, requires CARB to:

- Establish a statewide greenhouse gas emissions cap for 2020, based on 1990 emissions by January 1, 2008.
- Adopt mandatory reporting rules for significant sources of greenhouse gases by January 1, 2009.
- Adopt a plan by January 1, 2009 indicating how emission reductions will be achieved from significant greenhouse gas sources via regulations, market mechanisms and other actions.
- Adopt regulations by January 1, 2011 to achieve the maximum technologically feasible and cost-effective reductions in greenhouse gas, including provisions for using both market mechanisms and alternative compliance mechanisms.
- Convene an Environmental Justice Advisory Committee and an Economic and Technology Advancement Advisory Committee to advise CARB.
- Ensure public notice and opportunity for comment for all CARB actions.
- Prior to imposing any mandates or authorizing market mechanisms, CARB must evaluate several factors, including but not limited to impacts on California's economy, the environment and public health; equity between regulated entities; electricity reliability, conformance with other environmental laws, and ensure that the rules do not disproportionately impact low-income communities.

FISCAL IMPACT:
Work associated with this task is included in the current year overall work program (07-025.SCGS1)

Reviewed by:

Division Manager

Reviewed by:

Department Director

Reviewed by:

Chief Financial Officer

California Global Warming Solutions Act of 2006

Jonathan Nadler, Program Manager,
Air Quality & Conformity

Energy & Environment Committee
Transportation & Communications Committee
December 14, 2006

CO2 Emissions

- CO2 emissions increased 30% during the past century
- About 80% of United States GHG emissions and about 87% of California emissions due to fossil fuel combustion
- In California, approximately 43% of the CO2 emissions come from cars and trucks.
- California is 12th largest emitter of carbon in the world

AB32 Timeline

- January 1, 2008: Statewide greenhouse gas emissions cap for 2020, based on 1990 emissions
- January 1, 2009: Mandatory reporting rules
- January 1, 2009: Adopt plan indicating how emission reductions will be achieved
- January 1, 2011: Adopt regulations

Other Requirements

- Convene an Environmental Justice Advisory Committee and an Economic and Technology Advancement Advisory Committee
- Ensure public notice and opportunity for comment for all CARB actions
- Evaluate impacts on economy, the environment and public health; equity between regulated entities; electricity reliability, conformance with other environmental laws, and ensure rules do not disproportionately impact low-income communities

Timeline - California Global Warming Solutions Act of 2006

By July 1, 2007	The State Air Resources Board (ARB) forms Environmental Justice and Economic & Technology Advancement advisory committees.
By July 1, 2007	ARB adopts list of discrete early action measures that can be adopted and implemented before January 1, 2010.
By Jan 1, 2008	ARB adopts regulations for mandatory greenhouse gas (GHG) emissions reporting. ARB defines 1990 emissions baseline for California (including emissions from imported power) and adopts that as the 2020 statewide cap.
By Jan 1, 2009	ARB adopts plan indicating how emission reductions will be achieved from significant sources of GHGs via regulations, market mechanisms and other actions
During 2009	ARB staff drafts rule language to implement its plan and holds a series of public workshop on each measure (including market mechanisms).
By Jan 1, 2010	Early action measures take effect.
During 2010	ARB conducts series of rulemakings, after workshops and public hearings, to adopt GHG regulations including rules governing market mechanisms.
By Jan 1, 2011	ARB completes major rulemakings for reducing GHGs including market mechanisms. ARB may revise the rules and adopt new ones after 1/1/2011 in furtherance of the 2020 cap.
By Jan 1, 2012	GHG rules and market mechanisms adopted by ARB take effect and are legally enforceable.
Dec 31, 2020	Deadline for achieving 2020 GHG emissions cap.

For More Information

Please contact the ARB toll-free at (800) END-SMOG/(800) 363-7664 (California only) or (800) 272-4572. For information on the ARB's Climate Change Program, visit www.arb.ca.gov/cc/cc.htm. You may obtain this document in an alternative format by contacting ARB's Americans with Disabilities Act Coordinator at (916) 322-4505 (voice); (916) 324-9531 (TDD, Sacramento only); or (800) 700-8326 (TDD, outside Sacramento).

B A C K G R O U N D E R

The Greenhouse Effect And California

Simply put, the greenhouse effect compares the earth and the atmosphere surrounding it to a greenhouse with glass panes. Plants in a greenhouse thrive because the glass panes keep the air inside at a fairly even temperature day and night, and throughout the four seasons of the year.

Just as the glass lets heat from sunlight in and reduces the heat escaping, greenhouse gases and some particles in the atmosphere keep the Earth at a relatively even temperature. Greenhouse gases like carbon dioxide, methane, and nitrous oxide in our atmosphere keep the Earth's average surface temperature close to a hospitable 60 degrees Fahrenheit. Without the greenhouse effect, the Earth would be a frozen globe, with an average temperature of about 5 degrees Fahrenheit. Most life as we know it would cease.

Thus, the naturally occurring greenhouse effect is beneficial, creating a pleasant, livable environment on the Earth. Natural levels of greenhouse gases have changed in the past. However since the start of the industrial revolution, the rate of increase has accelerated markedly because of the use of machines powered by fossil fuels like coal and oil.

There appears to be a close relationship between the concentration of greenhouse gases in the atmosphere and global temperatures. The burning of fossil fuels produces large amounts of carbon dioxide as well as other pollutants. Many of these pollutants absorb infrared energy that would otherwise escape from the Earth. As the infrared energy is absorbed, the air surrounding the earth is heated. An overall warming trend has been recorded since the late 19th century, with the most rapid warming occurring over the past two decades. The 10 warmest years of the last century all occurred within the last 15 years. It appears that the decade of the 1990s was the warmest in human history, and preliminary information is pointing to 2002 possibly being the warmest year on record. Global warming is changing the Earth's climate.

While the evidence for climate change is overwhelming, it is impossible to predict exactly how it will affect California's ecosystems and economy in the future. There are, many areas of concern.

As the average temperature of the Earth increases, weather is affected. Rainfall patterns change. Droughts and flashfloods are likely to become more frequent and intense. Mountain snowcaps will continue to shrink. Climate change and the resulting rise in sea level are likely to increase the threat to buildings, roads, powerlines, etc. Agricultural patterns will change as crops and productivity shift along with the climate change. Physical changes such as these impact California's public health, economy and ecology.

We can expect to see worsening air quality, an increase in the number of weather-related deaths, and a possible increase in infectious diseases. Higher temperatures contribute to increased smog, which is damaging to plants and humans. Climate change also affects forests in ways that increase fire hazards and make forests more susceptible to pests and diseases.

One area of considerable concern is the effect of climate change on California's water supply. During the winter, high in the Sierra Nevada, snow accumulates in a deep pack, preserving much of California's water supply in "cold storage" for the hot, dry summer. If winter temperatures are warmer however, more precipitation will fall as rain, decreasing the size of the snowpack. Heavier rainfall in the winter could bring increased flooding. Less spring runoff from a smaller snowpack will reduce the amount of water available for hydroelectric power production and agricultural irrigation. Evidence of this problem already exists. Throughout the 20th century, annual April to July spring runoff in the Sierra Nevada has been decreasing, with water runoff declining by about ten percent over the last 100 years.

Another predicted outcome of climate change, a rise in sea level, is already being seen in California, with a 3 - 8 inch rise in the last century. This can lead to serious consequences for the large populations living along California's coast. Sea level rise and storm surges can lead to flooding of low-lying property, loss of coastal wetlands, erosion of cliffs and beaches, saltwater contamination of drinking water, and damage to roads and bridges.

Higher temperatures also cause an increase in harmful air emissions -- more fuel evaporates, engines work harder, and demands for electric power increase along with an increase in power plant air pollution. Air pollution is also made worse by increases in natural hydrocarbon emissions from vegetation during hot weather. High temperatures, strong sunlight, and a stable air mass are ideal for formation of ground-level ozone, the most health-damaging constituent of smog. As the temperature rises and air quality diminishes, heat related health problems also increase.

While carbon dioxide is the greenhouse gas emitted in the largest quantity, other greenhouse gases such as methane, nitrous oxide, and hydrofluorocarbons also contribute to climate change. Many greenhouse gases have lifetimes of decades or even centuries in the atmosphere, so the problem cannot be eliminated quickly. Thus, the problems we are experiencing today do not accurately represent the full effects we may see years from now based on current levels of greenhouse gases.

The United States has the highest emissions of greenhouse gases of any nation on Earth. In California, more than half of the fossil fuel emissions of carbon dioxide are related in some way to transportation. Fossil fuel combustion accounts for 98 percent of carbon dioxide emissions.

To lessen the State's contribution to climate change, California needs to start now - to develop integrated strategies that will reduce traffic congestion, criteria air pollutants, and emissions of greenhouse gases from mobile sources. To learn more about greenhouse gases and climate change, access the ARB's Internet site on these subjects at www.arb.ca.gov.

For More Information:

Call our Public Information Office at (916) 322-2990 or visit our website at www.arb.ca.gov

FACT SHEET

CALIFORNIA CLIMATE ACTIVITIES

California Environmental Protection Agency

The California Environmental Protection Agency (CalEPA) is responsible for coordinating amongst the various state agencies taking action to reduce greenhouse gas emissions. On June 1, 2005, Governor Schwarzenegger signed an Executive Order that established statewide greenhouse gas emission targets and directed CalEPA to lead a Climate Action Team. This Team, made up of high-level representatives from key state agencies, is charged with implementing programs and policies in the state that reduce greenhouse gas emissions.

California Air Resources Board

Transportation is the largest source of emissions in the state. The California Air Resources Board (ARB) approved motor vehicle regulations that, by 2016, will reduce greenhouse gas (GHG) emissions from new motor vehicles sold in the state by about 30 percent.

California Energy Commission

The California Energy Commission (CEC) develops and implements both building and appliance energy efficiency standards, prepares California's greenhouse gas inventory, develops transportation fuel policy and programs, and manages climate change research programs. In conjunction with the California Public Utilities Commission, the CEC also coordinates the Renewable Portfolio Standard and a variety of energy efficiency programs.

California Public Utilities Commission

In addition to coordinating with the CEC on energy efficiency programs and the Renewable Portfolio Standard, the California Public Utilities Commission (CPUC) requested that its regulated energy utilities address key issues pertaining to climate change. The CPUC requires regulated utilities to employ a "greenhouse gas adder" when evaluating competitive bids to supply energy. This adder is designed to capture the financial risk of emitting GHGs. The CPUC is also investigating the creation of a "carbon cap" on each regulated utility.

Other State Agencies

Climate change has cross-cutting effects that will impact the economy, agriculture, forests, and water resources. The California Business, Transportation and Housing Agency, Department or Food and Agriculture, Department of Forestry, Resources Agency and Department of Water Resources (DWR) are all considering programs and policies related to climate change. In its 2005 Water Plan, DWR included the impacts of climate change on water supply and quality as one of the challenges to water management.

California Climate Action Registry

The Registry is a public/private partnership created by the State of California to encourage companies, government agencies and other organizations that do business in California to voluntarily measure and report their greenhouse gas emissions. To date, the Registry has over 45 members including all major utilities, a number of California companies, cities, government entities and non-governmental organizations.

Sustainable Silicon Valley

The group of Silicon Valley manufacturers including ALZA, Calpine Hewlett-Packard, Lifescan, Lockeed, Oracle and PG&E, has pledged to reduce greenhouse gas emissions in Santa Clara County to 20% below 1990 levels by 2010.

California Cities

The Cities for Climate Protection Campaign goal is to reduce GHG emissions resulting from the burning of fossil fuels and other human activities. Over 25 California cities have joined the campaign including Los Angeles, Sacramento, San Francisco and Chula Vista.

Other California Companies

A number of companies with significant business interests in California have voluntarily reduced greenhouse gas emissions since the early 1990s. Dupont and IBM, two Fortune 500 companies, have reduced emissions by over 60%. Their actions resulted in a net savings in the billions of dollars. California is also home to numerous companies that produce technologies and products, such as solar panels, efficient lighting and hydrogen, that can be used to reduce greenhouse gas emissions.

STRATEGIES UNDERWAY IN CALIFORNIA THAT REDUCE GREENHOUSE GAS EMISSIONS

The table below lists greenhouse gas (GHG) emission reduction strategies that are already underway in California. These strategies, when fully implemented, significantly reduce greenhouse gas emissions in the state. The strategies listed here are considered "high-confidence" strategies and were evaluated by the California Climate Action Team (Team) to determine reasonable GHG targets. They will bring California half way towards meeting the 2010 target.

Strategies Already Underway in California

Lead Agency/Strategy	GHG Savings[1] (Million Tons CO_2 Equivalent) 2010	2020
[illegible]		
GHG Vehicle Standards (AB 1493)	1	30
Diesel Anti-idling	1	2
[illegible]		
Accelerated Renewable Portfolio Std (33% by 2020)	5	11
Million Solar Roofs	0.4	3
[illegible]		
Zero Waste/High Recycling Programs	7	10
[illegible]		
Full cost-effective natural gas efficiency improvements	1	6
Appliance Efficiency Standards[2]	3	5
Fuel-efficient Replacement Tires & Inflation Programs	3	3
[illegible]		
Reduced Venting and Leaks in Oil and Gas Systems	1	1
[illegible]		
Green Buildings Initiative	Not yet estimated	
[illegible]		
Hydrogen Vehicles	Not yet estimated	
Total Potential Emission Reductions[3]	**23**	**70**

1 These are approximations that best reflect our current knowledge given a committed and coordinated effort with strong state leadership in partnership with industry.

2 Included in the baseline are the 2004 energy efficiency goals which will result in an estimated reduction of 4 million tons of GHG emissions in 2010 and 13 million tons of GHG emissions in 2020.

3 Rounding may cause this number to be slightly different than the sum of the numbers for each strategy.

It should be noted that other strategies, such as the use of biofuels and landfill methane capture and use, are still being evaluated and will be vetted internally by the agencies represented on the Climate Action Team. The Team would ultimately be responsible for determining which other strategies are most likely to be successful in the state as well as considering any additional strategies not yet evaluated. In January 2006, the Team will report to the Governor on the next group of strategies to be enacted.